PEREGRINE
3D Monte Carlo

Advancing the Field of Radiation Treatment for Cancer

Introduction

Each year, more than 300,000 cancer patients in the United States receive radiation treatment with the expectation of being cured. Unfortunately, despite the best medical treatment available, over 100,000 of these individuals die with tumors still active at the primary cancer site. Experts in the field have concluded that a major contributing reason for these failures is that the radiation treatment planning is sometimes inadequate, providing either too little radiation to the tumor for a cure, or too much radiation to nearby healthy tissue, resulting in complications.

The PEREGRINE program, a new approach to planning radiation therapy, has joined the more than 4,000-year search for a cure for cancer. This search has been an arduous journey, traceable in recorded history to the Ancient Egyptians who used surgical techniques to remove tumors. It is a quest that has touched many of the fields of modern scientific endeavors including biology, chemistry, genetics, and physics.

What Is It?

Drawing on 40 years of expertise in radiation physics, researchers at Lawrence Livermore National Laboratory have developed PEREGRINE, a highly accurate computer system for calculating where and how much radiation is absorbed in the body during radiation treatment for cancer and other diseases. PEREGRINE has been designed to be fast and affordable, and run on low-cost computers. PEREGRINE can be plugged into existing clinical treatment planning systems through standard office networks, making PEREGRINE's unmatched capability and accuracy available to every cancer patient in clinics of all sizes and locations.

What Does It Do?

PEREGRINE accurately models the radiation beam delivery system for each planned treatment and uses each patient's CT scan for detailed information about the tumor and surrounding tissue.

How Does It Do It?

PEREGRINE applies a mathematical technique, called Monte Carlo, to simulate the trillions of radiation particles that enter the body during a treatment. By using the Laboratory's extensive databases on nuclear and atomic interactions, PEREGRINE calculates the actual dose by modeling how the radiation interacts with the materials in the patient's body.

Why It Matters

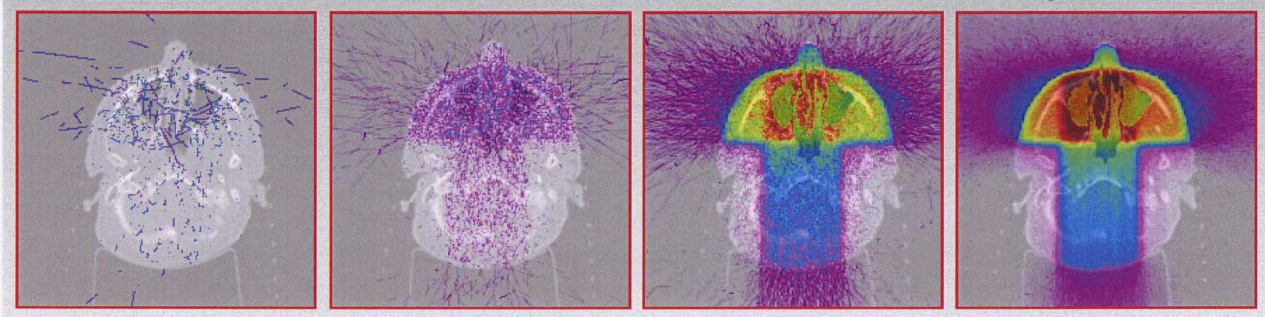
Because of the highly accurate dose calculations available from PEREGRINE, radiation therapy could soon be more effective for targeting tumors and safer for healthy tissue. The capabilities provided by PEREGRINE will also advance the field of radiation oncology by facilitating better clinical trials and more aggressive treatment methods.

Status

The Laboratory has moved PEREGRINE into the hands of the medical community by selecting NOMOS Corporation, Sewickley, PA as a partner in the commercialization of the PEREGRINE technology. FDA recently granted clearance to the NOMOS Corporation to make PEREGRINE available for clinics across the country. This is an industry first and a major step forward.

PEREGRINE enables more effective treatment planning

Time development of the PEREGRINE Monte Carlo dose calculation



Anterior and lateral opposed 6-MV beams with isocenter located in the paranasal sinuses.

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